Report

to

the Senior Grain Transportation Committee

COMPARATIVE COSTS OF MOVING GRAIN THROUGH THE WEST COAST, THUNDER BAY AND CHURCHILL

Prepared by

The Churchill Working Group
Efficiency Subcommittee

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RELEASED FOR DISCUSSION ONLY

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I INTRODUCTION

At the March 8th, 1985 meeting of the Senior Grain Transportation Committee the Honourable D. Mazankowski, Minister of Transport, requested that the Senior Grain Transportation Committee provide its view of the use and utilization of the Port of Churchill.

At that meeting the following Motion was passed:

> (Pound-Lang) "In the light of the financial constraints upon governments in Canada and the need to be sure that the most efficient use is made of available funds, the SGTC agrees to undertake a study of the economy of grain movement into Churchill and to report to governments at the earliest possible date."

The Senior Grain Transportation Committee charged the Efficiency Subcommittee with the responsibility of evaluating the grain movement through Churchill and a special Churchill Working Group was formed to carry out the analysis.

On April 23, 1985 the following terms of reference were adopted by the Churchill Working Group:

> "To evaluate the costs of moving grain to market through the Port of Churchill relative to the costs of the grain movement through the West Coast and Thunder Bay/St. Lawrence routes."

Because of time and human resource constraints a full and exhaustive study of the costs of moving grain through Churchill could not be carried out. Given the number of studies on Churchill in the last ten years, the Working Group drew on existing sources of information to avoid an unnecessary duplication of work. It was considered that the best approach would be to utilize the expertise of the various subcommittee members to arrive at cost comparisons, observations, conclusions and recommendations regarding the use of the Port of Churchill.

The following elements of the grain movement for the various routes were identified for review:

A. Country Elevator System

B. Rail System

C. Terminal Component

D. Ocean Freight

Where possible, the future investments contemplated for Churchill were listed.

In addition to contact with members of the Efficiency Subcommittee, the Working Group has had formal meetings with the Churchill Port Manager; the Canadian Wheat Board; the Transportation Division, Province of Manitoba; and the Port Churchill Development Board to solicit information and views regarding the Port of Churchill.

II SUMMARY OF FINDINGS

The findings and conclusions of the Subcommittee pertaining to the comparative costs of moving grain are as follows:

A. COUNTRY ELEVATOR SYSTEM

The movement of grain through the primary elevator system to the various ports does not reflect any differences in costs, which were estimated at $8.83 per tonne.

B. RAIL SYSTEM

In total, the direct and indirect rail costs to the various ports are as follows:

$ PER TONNE
TO

FROM	CHURCHILL		THUNDER BAY		VANCOUVER	PRINCE RUPERT
	Reford	Hague	Reford	Hague	Reford	Reford
	36.61	34.53	26.57	25.73	26.57	29.70

One of the large cost components for Churchill is that of line related costs. The movement of grain to Churchill is unique in that two line related costs are associated with it, i.e. the movement of grain over the branch line system and the movement over the Herchmer Subdivision. The Thicket Subdivision line related costs are included as well (though not recognized by the CTC) as the Subcommittee views this as a legal issue rather than a technical one.

The capital investment contemplated for Churchill represents an annual per tonne cost as follows (for a 750,000 tonne movement):

		Amortization Period
Box Car Rehabilitation		
with roller bearings	$6.83	5 years
with friction bearings	$17.33	5 years
Prototype Car	$6.90	30 years
Line Upgrading	$2.35	20 years

C. TERMINAL COMPONENT

The Churchill terminal costs are estimated at $8.87 per tonne. The Thunder Bay and West Coast costs are estimated at $7.59 per tonne.

Future investments such as dust equipment, dredging and the construction of the tug would translate into an additional cost of $2.54 per tonne.

D. OCEAN FREIGHT

The calculation of ocean freight proved to be extremely difficult given the lack of available data and the Working Group had to base its analysis on past experience. The ocean rates for grain to Antwerp/Rotterdam and Japan are as follows:

OCEAN FREIGHT

TO ANTWERP/ROTTERDAM			TO JAPAN	
Churchill	Thunder Bay Direct	Thunder Bay & St. Lawrence	Vancouver	Prince Rupert
22.10-28.60	24.17	12.21	23.13	

E. TOTAL COSTS

The comparative costs of moving grain from Reford and Hague, Saskatchewan to Western Europe and Japanese Ports are as follows:

TO WESTERN EUROPE						TO JAPAN	
CHURCHILL		THUNDER BAY DIRECT		THUNDER BAY & ST. LAWRENCE			
Reford	Hague	Reford	Hague	Reford	Hague	VANCOUVER Reford	PRINCE RUPERT Hague
76.13 to 82.63	74.05 to 80.55	67.16	69.25	75.28	77.37	66.12	69.25

F. PRICES

Given the confidentiality of CWB prices realized at the various ports a comparison taking into account prices and costs was not possible. Whatever discounting does take place at Churchill will lead to a direct advantage to Thunder Bay and the West Coast.

G. OBSERVATIONS

The Sub-Committee seriously questions the rehabilitation of railway box cars given their age, cost and poor efficiency.

The purchase of a new type car has yet to be demonstrated as desirable or cost effective.

Churchill represents additional cost to the producer of Western Canada given the capacity and operational advantages of the West Coast and Thunder Bay. Any future investments given the limited season and throughput of Churchill will only add to the unit cost per tonne of moving grain.

The Sub-Committe understands that the IBI Group of Toronto has been charged with carrying out a cost and capacity analysis of handling grain through Chuchill in comparison to other ports. The SGTC may wish to reference the findings of this report with that of the IBI Study.

III COUNTRY ELEVATOR SYSTEM

A cursory examination was made of the country elevator system in an attempt to identify costs that may be particular to any given movement. One contention has been that the Churchill movement incurs extra primary elevator storage costs as grain is held out prior to the opening of navigation for the rail movement to Churchill.

In discussing this matter with officials of the Canadian Wheat Board it was pointed out that this may have been the case from time to time, but presently the collection of grain for Churchill is handled in no different a manner than for the West Coast or Thunder Bay, i.e. grain is not stored or held out for the Churchill movement. A number of grain companies were contacted and similar responses were provided.

The movement of grain through the primary elevator system to the various ports therefore does not reflect any differences in costs.

However, it was noted that the area tributory to Churchill has a significant amount of rapeseed grown in it. During the Churchill shipping season rapeseed will be held out to satisfy either wheat or barley programs. One elevator company pointed out that in one year it was prevented from shipping

rapeseed for a period of 8 weeks while Churchill was in operation. The higher the movement to Churchill the greater the potential for such effects on other grains moving to Thunder Bay or Vancouver. While costs are associated with such disruptions no evaluation was carried out due to time constraints.

The various cost elements examined were as follows:

TABLE 1

ESTIMATED COSTS OF MOVING WHEAT THROUGH THE PRIMARY ELEVATOR SYSTEM

1984/85

COUNTRY ELEVATOR COSTS[1]	$ per Tonne
- elevation	6.40
- storage[3]	2.00
- shrinkage[2][4]	.43
TOTAL	8.83

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[1] Source: Canadian Grain Commission

[2] Paid by the farmer at the time of sale at the primary elevator. Shrinkage based on realized prices of $193.98 for 1983/84 and $170.00 for 1984/85 (per tonne).

[3] Period of storage are based on the average time in storage over the course of a year.

[4] The primary elevator shrinkage allowance (1/4%) is a direct cost to the producer. The terminal elevator shrinkage allowance is assessed against the primary elevator shipper and this cost is presumably covered by the primary elevator shrinkage or incorporated into the primary elevation tariff. There is no shrinkage allowance at transfer elevators although there is generally a loss in transit to the transfer elevators which is absorbed by the shipper (usually the C.W.B.).

IV RAIL SYSTEMS

A. GENERAL

In comparing the shippers costs of moving grain by rail to the various export positions of Churchill, Vancouver, Prince Rupert and Thunder Bay the delivery point of Reford on the CN Wainwright(5) Subdivision was selected as a reference point as it most closely represents a prairie point equidistant to the various ports.

The rates from Reford to the various ports are as follows:

TABLE 2
GRAIN RATES FROM REFORD, SASKATCHEWAN
IN $ PER TONNE (6)

	Destination		
	Churchill	Thunder Bay	West Coast
Rate Group	493	509	509
Shipper Rate	7.82	8.08	8.08
Federal Contribution	17.91	18.49	18.49
TOTAL	25.73	26.57	26.57

(5) In previous cost comparisons Scott Saskatchewan has been used as a point of comparison. With the realignment of the rate groups under the WGTA, Reford, Saskatchewan has been selected as the comparison point by the Canadian Grain Commission.

(6) CFAW Tariff 4310

While the rates cover the costs of transportation of grain by rail in general, they do not reflect the specific costs of operating a particular line or route. Under the rate setting mechanism of the WGTA the rate from any two delivery points to the same destination will, in general, only vary with the mileage(7).

While the rate from Reford to Vancouver and Thunder Bay may be the same the actual costs would be somewhat different. Vancouver is a higher cost route than Thunder Bay - given the mountainous terrain - which in part leads to longer cycle times, greater fuel expenditures, etc. A more accurate representation would depict a cost advantage on a per mile basis for Thunder Bay over Vancouver or Churchill.

Reford offers a point of comparison for all ports. However, it can be argued that this delivery point is outside the so-called Churchill catchment area and as such may lead to an overstatement of the grain rates that might normally apply to grain moving to Churchill.

To address this concern a second reference point was selected to compare the rates for a point within the Churchill catchment area and Thunder Bay. Vancouver was not included for this portion as the normal alternative for grain in this area would be Thunder Bay.

(7) RTC Staff Report Concerning the Pay to the CN Adjustment. Report No. REA-CD-85-01, February 11, 1985

The Port Churchill Development Board was contacted and it was suggested that the average rate for grain moving to Churchill is in the area of 7.12. A point with this approximate rate is Hague, Saskatchewan on the CN Warman Subdivision.

The rates are as follows:

TABLE 3
GRAIN RATES FROM HAGUE, SASKATCHEWAN
IN $ PER TONNE ([6])

	Destination	
	Churchill	Thunder Bay
Rate Group	453	493
Shipper Rate	7.19	7.82
Federal Contribution	16.46	17.91
TOTAL	23.65	25.73

B. ADDITIONAL OPERATING COSTS

In examining the rail costs, an attempt was made to identify the extra costs, if any, associated with a particular line and the Working Group elected to use the railway costs presented to the Canadian Transport Commission in regard to the CN adjustment ([8]).

In its submission to the Canadian Transport Commission, CN identified additional line related and volume costs for the operation of the line to Churchill, (the CN line from Thompson Jct. to Churchill 310.1 miles).

(8) Given the time limitation, a detailed cost comparison of the West Coast/Thunder Bay routes was not possible.

i. **Line Related Costs**

Line related costs are associated with grain dependent branch lines and in general refer to: maintenance and ownership costs including depreciation, cost of capital and taxes.

A line is designated as grain dependent if its existence depends on that traffic. Therefore, the line related costs incurred by a railway for the operation of grain dependent branch lines are assessed against the grain movement. In railway costing these cost are specific to the branch line and it is argued that these costs would not be incurred if the line were abandoned.

The line related variable costs do not vary with traffic volume but vary with the presence of grain traffic. In very simplistic terms with zero grain traffic no line related cost could be charged against grain,however, with the first carload of grain the costs would be charged soley to grain. However, the costs would remain the same whether 1 car or 1000 cars were handled.

Churchill is unique in that it has an additional line related cost element associated with it. The first line related costs is for grain moving off a grain dependent branch line and a second line related cost for the grain movement over the Churchill line. Stated another way the movement to Churchill incurs an additional line related cost that is not present in the transportaion of grain to the West Coast or Thunder Bay.

The line related costs associated with the 310.1 miles of the CN line from Thompson Junction to Churchill were:

TABLE 4
CHURCHILL LINE COSTS IN 1984/85 $([9])

	Churchill Line Costs in 1984/85	Per Mile Line Costs for 310.1 Miles
1981/82	4 558 812	
1982/83	4 512 291	
1983/84	4 388 743	
AVERAGE	4 486 615	14 468

Therefore the extra grain movement cost for the Thicket and Herchmer Subdivisions is equal to

$14,468 x 310.1 miles (Herchmer miles) = $4,486,527 for 1984.([10])

([9]) RTC Staff Report CN adjustment Feb 11, 1985 Page 27.
([10])IBID Page 22.

As the 1984 movement of 359,300 tonnes represents the second lowest movement in a ten year period, the Working Group elected to use a ten year average of 530,000 tonnes(11) for all the calculation to present a more accurate reflection of the per tonne costs.

Based on a movement of 530,000 this translates into an additional cost of $8.47 per tonne. As stated previously the cost remains fixed whether one or a thousand cars are handled. Therefore a decrease in the tonnage handled will increase the costs per tonne accordingly. For example, if the actual 1984 rail movement of 359,300 tonnes had been used, the average line costs would have been in the order of $12.49 per tonne.

It should be noted that the Thicket Subdivision has not been declared a grain dependent subdivision by the Canadian Transport Commission and that this matter is before the Commission for review. As such, the line related costs for Thicket are not in the rate base. However, this is more a legal issue than a technical one. There is also an inconsistency in the costing procedures in that the additional line related costs for Herchmer and Thicket are recognized, while the line related are excluded for Thicket. The point to be made is that the inclusion of the Thicket line related costs will add to the overall rail costs - costs which producers will have to pay.

(11) Statistical Handbook, Canada Grains Council 1984 for year 1975/76 to 1983/84 and Canadian Grain Commission for year 1984/85.

For comparison purposes, the line related costs for each portion are as follows:

Herchmer $14,468 X 179.6 = $2,598,452 or 4.90 per tonne
Thicket $14,468 X 130.5 = $1,888,074 or 3.56 per tonne*

*May not add due to rounding

While the line related costs for the Thicket Subdivision have not been accepted by the CTC - the Commission has made an adjustment for the line related cost CN has incurred over and above its average line related cost.

Churchill has higher than average line related costs due to the additional maintenance required. In reviewing this matter with CN personnel it was stated that "The higher level of maintenance on the CN line can be attributed to the unstable subgrade in the territory. During the summer months, it is necessary to supplement the work force to maintain the track. Large quantities of pit run ballast are required to support the continual bermings on this track and to fill the sink holes. In addition, costs are higher due to the additional work train requirements and longer lengths of haul to acquire and place ballast in the territory."

These additional costs, given the averaging of costs included in the rate scale, are not in fact paid by the producer shipping grain to Churchill - but rather by all producers - both on CN and CP lines. They are added to the cost base - and these line related costs either represent or will represent an additional cost of 14.10 cents per tonne for every tonne of grain shipped (line related costs of $4,486,615 divided by GTA average forecasted movement of 31.8 million tonnes).

It can be argued that even without grain traffic the line to Churchill would remain, and its line related costs would be incurred. However, if there were no grain traffic whatsoever the costs incurred on the line could not be charged against grain and ultimately to the producer.

ii. Additional Volume Related Costs for Churchill

In its submission to the Canadian Transport Commission, CN identified the additional costs of operating the line to Churchill. This was calculated by comparing the costs of operating boxcars to Churchill under existing conditions to the cost of operating a service to Churchill based on CN's normal mix of boxes, railway hoppers and Government hoppers.

For 1984 it is estimated that these additional volume-relatedcosts associated with the Churchill line amount to $718,500. This translates into a cost of $1.99([12]) per tonne.

These higher costs on the Churchill line are a result of the following factors:

- Train weight is less than average
- Average number of diesel units is greater
- Number of caboose miles is higher
- Crew wages are higher
- Train miles are greater
- Tonnes per car are significantly less

The reason these unit costs are higher is that CN realizes less tonnes per trip on the Churchill ine in comparison to other routes,

eg. Churchill- 150 car box train x 55 t. = 8250 t.

98 car hopper train x 94 t. = 9212 t.

([12])IBID, page 23

NOTE:

The Canadian Transport Commission did not include this amount its calculation of the CN adjustment as it was the opinion of Legal Services Branch of the Candian Transport Commission tha interpretation of the WGTA restricts the amount determined un Section 56(1)(b) to line-related variable costs. Nonetheless costs were incurred.

In contrast to the line related costs, the volume related costs vary with traffic. That is the absolute costs increase with traffic while the cost per tonne remains the constant.

C. ADDITIONAL START UP/WIND DOWN COSTS

In discussing the operation of the CN line to Churchill it was pointed out that CN incurs additional costs for the start up and wind down of the season in the order of $220,000. This is related to the placement and housing of crews for the 3 month period of operation. Based on a movement of 530,000 tonnes, this equals a cost of $0.42 per tonne.

D. ADDITIONAL COSTS RELATING TO THE OPERATION OF THE LINE TO PRINCE RUPERT

As noted previously, the rates, in general are distance related. One exception is that of the rates established for the movement of grain to Prince Rupert. While the average haul to Prince Rupert is 184 miles greater than the average haul to Vancouver, in the interest of port parity the rates were set on an equal basis.

The additional costs associated with the greater haul to Prince Rupert were calculated as follows by the Canadian Transport Commission.

The base rate scale increases in equal increments of 8 cents per tonne for every additional 25 miles of haul up to a length of 1200 miles. An additional haul of 175 miles implies an

additional base rate of 56 cents per tonne, while an additional haul of 200 miles implies an additional base rate of 64 cents per tonne. The additional haul to Ridley Island of 184 miles therefore implies an additional base rate of approximately 60 cents per tonne.(13)

The freight rate multiplier for 1984/85 was 5.22 which when multiplied by the base rate of 60 cents per tonne would result in a 1984/85 rate addition of $3.13 per tonne.

E. FUTURE COSTS

Under the Canada - Manitoba Subsiduary Agreement there are a number of proposals contemplated or underway in regard to Churchill.

NOTE: All costs in this section have been based on a rail movement of 750,000 tonnes as per the Manitoba-Canada subsidiary agreement.

Rail Infrastructure Improvements

i. Boxcar Rehabilitation

CN is to provide adequate railway rolling stock to carry 750,000 tonnes of grain to at least the year 1990. CN is to rehabilitate 1000 boxcars. "The average estimated cost of

(13)IBID, page 16.

rehabilitating one boxcar (1983-84 $) is $26,300 if roller bearings are required... and $16,300 if CN is successful in its request to the RTC of the CTC to change its requirement that 75% of the car fleet is to be equiped with roller bearings by 1987".

In addition, CN is to undertake the design and construction of a prototype grain car, field test it and carry out an economic study of the manufacture and operation of a fleet of new cars. If the decision is made not to build a new fleet of cars then "up to 1000 additional cars will be rehabilitated".

At present,([14]) there are some 6846 boxcars remaining in the dedicated grain fleet; 3114 CN and 3532 CP boxcars. With current attrition rates, it is forecast that the fleet will decline to approximately 2,100 cars by 1990/91.([15])

With a cycle time of approximately 20 days and an average weight of 55 tonnes per car([16]), it would take 3000 boxcars for a movement of 750,000 tonnes. If current attrition rates continue, CN will not be able to service Churchill with boxcars by 1987. If CP boxcars are made available, Churchill could be serviced with boxcars up to 1990/91 without the boxcar rehabilitation program.

([14]) As at July 17, 1985 - GTA
([15]) Rail Boxcar capacity and requirements to 1991. GTA July 1983 pg. 2.
([16]) IBID

If only 1000 boxcars are rehabilitabed with roller bearings at a cost of $26,300, the cost over a five year period would equal $6.83([17]) per tonne for the 251,000 tonnes these cars could carry. If the cars are not rehabilitiated with new roller bearings, the per car cost would be reduced to $16,300. However, the per tonne costs would be increased to $17.13 per tonne as these cars could not be used in anything but the Churchill service due to the CTC ruling on the restricted use of cars with friction bearings. In fact, it could be argued that the full rehabilitation cost of $6.94 million for roller bearing equipped cars should be charged against Churchill for, as the railway's fleet becomes predominantly hopper car equipped and the branch line system upgraded, the need for boxcars will eventually be restricted to Churchill. This per tonne cost only represents ammortized rehabilitation costs. The rehabilitation and use of boxcars perpetuates an inefficient system both in loading, transit and unloading of grain. For example, The use of boxcars represents an additional cost of $1.99 per tonne over the existing mix of hoppers and boxers for the grain movement to Churchill. That is, the boxcar rehabilitation cost of $6.83 per tonne cannot be compared to the prototype car cost of $6.90 as the old box incurrs additional operating costs over and above that of a hopper car.

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(17) $26,300 X 1000 cars = $26.3 million X capital cost recovery factor (at 10%) of .26380 = 6.938 million per year ÷ 251000 tonnes ÷ 4 = $6.83

Discussion Notes Boxcar Rehabilitation

Since 1974 approximately 7,400 boxcars have been rehabilited. The attrition rate on these rehabilitated cars has been greater than anticipated and the experience to date indicates that the expected 5-year extension of service life has not been consistently achieved. The Sub-Committee has serious reservations regarding the advisability of rehabilitating 35-40 year old cars([18]) (as outlined by the GTA on its study on Box Car requirements the additional service life realized by rehabilitating cars was somewhat less than the 5 years originally anticipated). The frequent repair of the running gear has been one of the more significant problems experienced with the previously rehabilitated cars. Further, the chance of failure of major structural components of 35 to 40 year old boxcars increase with each passing year, and it is unrealistic to expect such cars to remain very long in service, no matter how extensive the rehabilitation program which has been carried out.

([18]) Rail Boxcar Capacity and Requirement to 1991 - GTA July 1983.

There are other major shortcomings:

1) The rehabilitation of railway boxcars is only a temporary solution. After approximately 5-10 years as the boxcars are retired, the question on the servicing of the Port of Churchill would have to be addressed again.

2) The extended use of boxcars will necessitate the retention of special unloading facilities at the terminals for boxcars. While duplicate unloading facilities can be justified with a boxcar fleet of 14,000 cars, the economics will become questionable with a fleet of 3,200 cars. Furthermore, the boxcar dumpers, like boxcars, can only be maintained at a relatively high cost. The car dumpers also experience a relatively high mechanical failure rate, which in turn reduces productivity.([19])

([19]) Rail Boxcar Capacity and Requirements to 1991 GTA July 1983 pgs. 13-15.

ii. **Prototype Car**

If the new prototype hopper car proves successful, it could be used to replace the aging boxcar fleet. Assuming a cycle time of 17 days(20) and the average load of 94 tonnes,(20) approximately 1500 of these new type of hoppers would be required for Churchill for a 750,00 tonne movement. These new hoppers cost approximately $85,000 each and a total fleet to service Churchill would cost approximately $128.0 million. Amortized over 30 years and assigning 3 months use per year(21) on these cars to Churchill, as well as the cost differential of $15,000 per hopper car for the remaining 9 months, the yearly cost would be approximately $6.90 per tonne for a 750,000 tonne movement.(22, 23)

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(20) Based on discussions with CN research - Winnipeg. The position is taken that given a purchase choice of a regular steel hopper car at $70,000 and a special car at $85,000, CN would choose the cheaper car. Therefore the full cost difference of $15,000 is assigned to Churchill.

(21) The costs for three months use are assigned against Churchill and not any other port as CN would not purchase any type of car at this time given today's and forecasted market conditions, i.e. poor crops and slow sales. There is currently a surplus of hopper cars on the North American car market and short term needs such as Churchill could be satisfied through car leases - at significantly lower costs.

(22) All calculations are based on 10% interest rate using a capital recovery factor.

(23) 750,000 tonnes has been selected as this is tonnage used for calculation purposes on Canada-Manitoba Subsidiary agreement. For comparison purposes, assuming a 500,000 tonne movement, the annual per tonne co;sts would equal $7.63 per tonne.

Discussion Notes - Prototype Car

While the Grain Transportation Agency in its report on the boxcar capacity to 1990 recommended that the option of a new car type be reviewed, the Efficiency Subcommittee must seriously question the option of purchasing 1500 new rail hopper cars.

The federal government has expressly stated it will not be purchasing hopper cars to augment the railway car fleets in the future. The onus to purchase cars will fall on either the provincial governments, producers or railways. If the railways, in particular CN, are placed in a position of having to purchase an additional 1500 cars the costs will be factored into the rate base. The effect being that all producers, no matter what port or railway they are using, will pay. While it can be argued that new cars will ultimately be required to haul grain due to the normal attrition of cars and future growth of the grain industry there are a number of economic questions:

1) Is it operationally sound to have two different and distinct car fleets?.

2) What is the economic justification for buying a high cost car for a limited 3-month need?

3) What are the additional system costs of having to switch out selected empty cars for specific branch lines for loading to specific ports.

4) Is the new car cheaper than existing Steel hopper cars on a per tonne basis? While the capacity of the new car is 8% greater than a conventional hopper car (108 tons VS 100 tons) the new car is 13% longer - (66.4 feet vs. 59 feet). This will result in less tonnes per train, given that there are train length restrictions, vs. a train made up of standard length steel hopper cars. In addition, the additional length of these few cars will in effect reduce the siding capacity of the primary elevators. eg. a four car spot will be reduced to three cars.

5) Is it economically prudent to purchase cars for short term requirement when cars can be acquired through the lease market at significantly lower costs? Is there an off-season requirement for these cars?

(6) The Efficiency Subcommittee is also of the opinion that the use of this new designed car on light density branch lines is a moot point. The branch line problem is only short term given the Federal Branch Line Rehabilitation Program and the

potential for rationalization as outlined in the Efficiency Sub-Committee Report on Branch line abandonment. Furthermore, the extra costs and time involved in switching a special car for either a given branch line or port could be quite significant.

It is the Sub-Committee's understanding that these issues are being reviewed by CN, who will report on them once the pilot project is completed on the prototype car.

iii. Upgrading of the Railway Roadbed

No major capital programs are planned on the Herchmer subdivison by CN in the next few years.

This subdivision was rehabilitated under the Grain Line Rehabilitation Program and as such CN expects that any work in the near future would be of an operating maintenance nature. However, CN continues to experience problems with the discontinuous perma-frost on both the Herchmer and Thicket Subdivisions.

One of the major problems with the line is track settlement due to uneven ground thawing in the discontinuous permafrost areas. The unstable subgrade condition can result in 4" to 6" sinkholes and uneven track levels.

A study carried out for CN in 1982([24]) indicated that the roadbed might be stabilized through the use of "heat pipes" (or Cryo anchors) at the margins of perma-frost areas. [The heat pipes act as a refrigeration system, lowering the temperature at the edge of the perma-frost sections thereby tending to keep them frozen year-round and so controlling the uneven settlement encountered in these areas.]

At present there are 254 known sink holes and EBA Engineering Consultants estimated that it would cost $15,000,000 (1982) to stabilize the roadbed at the identified sink holes.

This might provide a permanent solution to the line problem and, if so, a special car fleet would not have to be built. However, CN has expressed concern that not all of the sink hole locations may have been identifed and that cryo anchor technology is still in the testing stages.

Under the Canada-Manitoba Subsiduary Agreement, "It is now proposed to conduct further geotechnical investigations of the discontinuous permafrost zones on the Thicket and Hirchmer Subdivisions to define more precisely the nature and extent of the roadbed foundation problems.

([24]) Embankment Stabilization Research Program Branchline Rehabilitation Hudson Bay Railway Herchmer Subdivision. EBA Engineering Consultants Ltd., Arctic Geotechnical Group, September 1982.

The potential future rail cost for Churchill are broken down as follows:

TABLE 4

		Total Cost Millions	$ per tonne	
Boxcar Rehab				
roller bearings	1000 cars	263.0	$6.83	(for 251,000 tonnes)
friction bearings	1000 cars	163.0	$17.13	
New Prototype Car	1000 cars		$6.90	
Line Stabilization			$2.35	

Please note that the rail infrastructure improvements and rolling stock items contemplatedunder the Canada-Manitoba Subsiduary Agreement are estimated to total $38.73 million dollars over the next five years and would not cover the purchase of the the number of prototype cars required for Churchill.

F. SUMMARY OF RAIL COSTS

In summary, the rail cost component of moving grain from Reford to the various ports is as follows:

TABLE 5
1984/85 COSTS
$ per tonne

	CHURCHILL		THUNDER BAY		VANCOUVER	PRINCE RUPERT
	Reford	Hague	Reford	Hague	Reford	Reford
Shipper Rate	7.82	7.19	8.08	7.82	8.08	8.08
Federal Contribution	17.91	16.46	18.49	17.91	18.49	18.49
Sub-Total	25.73	23.65	26.57	25.73	26.57	26.57
OTHER COSTS						
Start up/ Wind down	0.42	0.42	-	-	-	-
Line Related - Herchmer & Thicket Subs.	8.47	8.47	-	-	-	-
Volume Related	1.99	1.99	-	-	-	-
Distance Related	-	-	-	-	-	3.13
Sub-Total	10.88	10.88	-	-	-	3.13
TOTAL	36.61	34.53	26.57	25.73	26.57	29.70

POTENTIAL FUTURE INVESTMENT COSTS FOR CHURCHILL
ANNUAL COST PER TONNE

	Total Cost Millions	Cost per Tonne	Amortization Period
Boxcar Rehabilitation			
with Roller Bearings	$26.3	$6.83	5 years
with Friction Bearings	$16.3	$17.33	5 years
Prototype Car	$128.0	$6.90	30 years
Line Upgrading	$15.0	$2.35	20 years

NOTE: The "other investment" costs are not cumulative as it is assumed that the line stabilization and hopper car purchase program would be an either/o situation

V TERMINAL COMPONENT

A. GENERAL

The costs for the terminal elevator component were based on Canadian Grain Commission tariffs for the various operations i.e. receiving, elevating, shipping cleaning and drying.

It is acknowledged that tariffs, which in general are quite uniform between the various ports, may hide costs differences in the operating characteristics of the various ports, geographical differences and operating, maintenance and capital investment policies. For example Churchill must try and recoup start up costs and shut-down costs over a much shorter period of time then Thunder Bay. Because the facilities at Vancouver and Thunder Bay are privately owned, access to and cost of investment capital may differ in comparison to Churchill which is owned by the Government of Canada and operated by Ports Canada. Investment decisions may or may not be made on strict economic grounds.

The tariffs do, however, reflect some of the cost differences as evidenced in the higher elevation charges. The terminal cost were calculated as $8.62 per tonne for grain moving through Churchill and $7.59 per tonne for grain moving through the West Coast and Thunder Bay.

The Study Working Group was able to identify the Canadian Grain Commissions extra operating costs incurred at Churchill, over and above these experienced at Vancouver and the West Coast. The bulk of these expensee pertained to travel and relocation and rentals. For 1984, these additional expenses totalled $130,101 or $0.25 per tonne, factored over an average movement of 530,000 tonnes.

In total the terminal cost is $8.87 in tonnes per tonne for grain moving through the Churchill and 7.59 for the other ports.

In summary, the terminal costs/tariffs are as follows:

TABLE 6
TERMINAL COSTS
1984/85

	CHURCHILL	THUNDER BAY	WEST COAST
Elevation	4.58	4.18	4.18
Cleaning	2.01	1.58	1.58
Storage	.93	.93	.93
Outward CGC fees	.79	.79	.79
Other fobbing costs	.31	.11	.11
SUB TOTAL	8.62	7.59	7.59
Additional CGC costs (travel, relocation, rentals etc.)	.25		
TOTAL	8.87	7.59	7.59

The Study Working Group also discussed the costs of such activities as tugs, dredging, ice breakers, etc. There was some feeling that these activities would entail higher costs at Churchill because, whereas they are assignable to grain only at Churchill, at other ports they are shared among many commodities. However, the Group did not have time to explore this area in detail.

B. FUTURE COSTS

As noted in the previous section or rail costs, CN is testing a new protype grain car for the Churchill service and carrying out tests on stabilizing the line.

Churchill may eventually have to construct an additional hopper car unloader to efficently handle these types of cars.

It is estimated that such a facility would cost in the neighbourhood of $800,000[25]. Amortized over a 20 year life at a 10% interest rate this would equal an annual cost of $94,000 or 0.13 cents per tonne based on an annual throughput of 750,000 per year. (at a throughput of 500,000 tonnes this cost would rise to 19 cents per tonne.

As with the rail sections there are projects or programs considered under the Canada-Manitoba Subsidiary Agreement on Churchill.

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[25] Based on UGG'S construction of a hopper car unloader at Thunder Bay.

These are as follows:

TABLE 7
FUTURE INFRASTRUCTURE INVESTMENT

	Total Cost	Annual Cost	Cost Per Tonne
Elevator Health and Safety Improvement Program			
- dust control equipment	5.1 m		
- removal of asbestos insulator	0.11 m		
	5.21 m	$553,000	0.74
Dredging			
- deepening of berth to 11.6 metres at Ports Canada's expense	6.1 m	993,000	1.32
Tug construction	3.44 m	365,000	.48
TOTAL	14.75 m	1.91 mill.	2.54

Assuming an annual movement of 750,000 tonnes and an amortization period of 30 years for the elevator improvements and the tug construction and an amortization period of 10 years for the dredging, the annual costs would equal $1.91 million or $2.54 per tonne for a grain movement of 750,000 tonnes.

VI OCEAN FREIGHT

The calculation of ocean freight rates has proven to be extremely difficult.

The only public source for ocean freight rates available to the study team was the Maritime Research, Inc. Chartering Annual. There are two major problems:

1. The number of rate quotations out of Churchill are limited (for 1984, there was one quotation out of Churchill) as most vessels are on a time charter rather than a cargo basis or are registered by centrally planned governments with their own merchant marine, even within the short Churchill season time frame.

2. There is a great volatility in ocean freight rates making cost comparisons difficult.

However, based on past studies([26]) a number of observations and inferences can be made. See Table 8.

([26]) Exporting Grain Through the Port of Churchill A Capacity Cost and Systems Analysis. Canada Grain Council May 1981; and Churchill As an Outlet for Prairie Grain Canada Grains Council, May 1984.

Up until 1978/79 factors such as technological advances in shipbuilding and in cargo handling tended to offset inflation and ocrean freight rates tended to remain relatively stable.

From 1978/79 to the early 80's worldwide inflation, OPEC price increase resulted in dramatic increases in ocean freight rates. Comparing 1968/69 and 1979/80 it is evident that the Churchill grain route has been the most susceptible to upward cost pressures, the Hudson Bay Route quotations increased some 400% over this period.

In contrast, freight rates for the St. Lawrence ports to Rotterdam and the UK increased 202 and 241 percent respectively. While the Pacific Ports to Japan routes increased by 286 percent.

Since 1980 the recession in world trade, falling oil prices and over supply of ocean shipping has tended to reduce the rates.

TABLE 8

FREIGHT RATES FOR HEAVY GRAIN OVER SELECTED ROUTES: a/ANNUAL AVERAGES b/ 1960/61 TO 1979/80 IN US $

ROUTE	CANADA AND USA GREAT LAKES PORT TO ROTTERDAM	CANADA ST. LAWRENCE PORTS TO ROTTERDAM	CHURCHILL,MAN TO ANTWERP/ ROTTERDAM	CANADA AND USA NORTH PACIFIC PORTS TO JAPAN
1960/61	- d/	-	4.17	6.05
1961/62	-	-	4.99	6.11
1962/63	-	3.62	4.02	5.65
1963/64	-	4.67	4.80	7.34
1964/65	-	4.67	5.16	7.79
1965/66	-	4.41	6.19	8.10
1966/67	-	3.58	4.61	7.67
1967/68	-	4.07	5.26	8.79
1968/69	-	5.44	4.93	7.84
1969/70	-	5.26	4.64	10.04
1970/71	-	4.92	8.93	10.64
1971/72	-	2.60	3.92	6.63
1972/73	13.15	6.37	4.87	11.90
1973/74	22.89	13.13	-	26.17
1974/75	15.00	6.77	-	21.84
1975/76	14.41	4.82	7.85	14.33
1976/77	13.78	5.02	-	14.90
1977/78	18.59	9.39	21.00	17.79
1978/79	14.72	5.11	9.00	14.06
1979/80	36.47	16.44	25.00	30.25
1980/81	40.76	15.80	-	31.02
1981/82	26.73	10.34	-	26.18
1982/83	19.53	8.85	-	17.30
1984		9.30-10.15 e/		17.00-18.00

Percentage Change over the period:

	1975/76 to 1979/80	1968/69 to 1979/80
CANADA AND USA GREAT LAKES PORTS TO ROTTERDAM	+153	-
CANADA ST. LAWRENCE PORTS TO ROTTERDAM	+241	+202
CANADA ST.LAWRENCE PORTS TO UNITED KINGDOM c/ (US $ per long ton-)	+240	+241
CHURCHILL, MAN. TO ANTWERP/ROTTERDAM	+218	+407
AUSTRALIA TO INDIA (EAST COAST)	+ 81	+311

a/ All cargo shipment sizes are in the 10,000 to 45,000 dead weight ton tange.
b/ Basis crop years August/July 1958/59 and July/June 1968/69 onwards.
c/ As from 1971/72 basis Tilbury discharge.
d/ No freight rate quotations were published or available.
e/ To Marseilles.

Sources: International Wheat Council. Review of the World Wheat Situation, 1976/77 and 1979/80, and World Wheat Statistics 1980; and Maritime Research, Inc. Chartering Annuals: Charter Fixtures Reporting in New York and London. New York: Maritime Research, Inc., 1958-1979.
Canadian Grain Commission, Grain Exports 1980/81 to 1982/83 table reproduced, in part, from the report Churchill as an Outlet for Prairie Grain.

For 1984 the average rates out the Pacific ports to Japan were in the order $18 U.S. per tonne and in the order of $10.00 U.S. per tonne out of the St. Lawrence to France. The one rate quotation noted for Churchill was $17.00 per tonne. These rates most closely represent the rates experienced in 1978/79. i.e. 17.79 to Japan and 9.39 to Rotterdam. Given that there is some rate relationship between the various ports it is assumed for the purposes of this stud, that the rates to Churchill are in the order of $21.00 U.S. per tonne and $18.59 U.S. per tonne for grain moving out of Thunder Bay directly to Europe. Please note that the one rate quotation for Churchill was at $17.00 U.S. in 1984. Given the spread in rates a range of 17.00-21.00 has been used for Churchill.

In respect to ocean rates for Churchill it is taken as fair approximation since in one of the studies it was concluded that:

> "In the past, Churchill's comparative advantage is the Western European grain market has largely stemmed from a favorable ocean freight rate differencial which reflected significant distance savings. With the developments and changes in the ocean transportation of grain over the last decade, however, this advantage ..... has been eroded." (27)

The cautionary note is repeated again that it is difficult to make any precise statement on ocean rates especially for Churchill given that such an extrapolation had to be made.

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(27) Export Grain through the Port of Churchill. A capacity cost and systems analysis Canada Grains Council p. 79.

The ocean rates from the various ports are as follows (Rates have been coverted to Canadian $ for this part of the exercise):

OCEAN FREIGHT

TO ANTWERP/ROTTERDAM			TO JAPAN	
Churchill	Thunder Bay Direct	Thunder Bay & St. Lawrence	Vancouver	Prince Rupert
22.10-28.60	24.17	12.21		23.13

VII LAKE TRANSPORTATION

The lake transportation costs were provided by the Canadian Wheat Board to the Canadian Grain Commission and is listed at $13.35 per tonne. In discussing the matter of lake freight costs with the CWB it was stated that the Board is in the last year of a multi-year agreement with the Lake Shippers. Given the low volume movement projections for 1985/86 for grain and other bulk traffic lake freight can be purchased at $6.00 to $6.50 per tonne. It is unlikely, however, that long term agreements could be signed at such levels and probably represent the variable portion of costs and not the full costs which include depreciation and cost of capital.

VIII ST. LAWRENCE PORTS

The St. Lawrence Port costs are based on CGC tariffs of $3.70 for inward and outward elevations, $1.09 for storage and 0.29 for other fobbing costs.

IX INCLUSION OF FUTURE COSTS

The grain system has a physical capacity in the neighbourhood of 37.2 to 46.7 million tonnes broken down as follows:

TABLE 12
SYSTEM CAPACITY

Vancouver	12	to 15	M.T.
Prince Rupert	3.5	to 5	M.T.
Interior	1.7		M.T.
Thunder Bay	20	to 25	M.T.
	37.2	to 46.7	M.T.

The lower limit is based on existing operating practices and the higher marginal improvements in car cycles and tonnes per car.

To date the maximum grain movement has been in the order of 35.0 million tonnes for all WGTA Grains (1983/84 Crop Year). The 1984/85 movement will equal approximately 27 million tonnes with the prospect for 1985/86 only marginally better.

The trend grain movement, as well as an estimate of upper or maximum limits, as estimated by the GTA,(28) for the next five years is as follows:

TABLE 13
GRAIN MOVEMENT IN MILLION TONNES

	1986/87	1987/88	1988/89	1989/90	1990/91
TREND	33.0	33.7	34.4	35.1	35.8
HIGH	35.2	36.8	38.5	40.2	40.9

Even assuming a maximum growth in the grain movement it is highly unlikely the system will be short capacity.

The point to be made, is that there is little to suggest that the movement through Churchill represents grain exports that could not otherwise be made through the West Coast or Thunder Bay.

The Efficiency Sub-Committee reiterates the statements made in the Study Churchill As An Outlet For Prairie Grain.

> "Since a substitantial share of the grain exported through Churchill can be considered diverted from Thunder Bay, shipments from the latter port are thereby lowered. In terms of capacity the entire Churchill movement could be handled at Thunder Bay in the course of one week. The reduced volumes at Thunder Bay adversely affect terminal elevator returns. Furthermore, the Churchill movement also represents an equivalent reduction in the volume moved by vessels on the Great Lakes. This reduction in volume can be expected to be reflected in higher shipping charges for the grain actually moved since many of the costs incurred do not vary with volume".

(28) Source GTA

The committee has highlighted the future investment costs for Churchill in that it can be argued that the operations of Churchill represent an additional cost to the producer of Western Canada given the capacity and operational advantages of the West Coast and Thunder Bay.

X SUMMARY OF 1984/85 COSTS

A. 1984/85 COSTS

In summary, the comparative costs of moving grain from Reford Saskatchewan to Western Europe and Japanese Ports are as follows:

TO WESTERN EUROPE						TO JAPAN	
CHURCHILL		THUNDER BAY DIRECT		THUNDER BAY & ST. LAWRENCE		VANCOUVER	PRINCE RUPERT
Reford	Hague	Reford	Hague	Reford	Hague	Reford	Hague
76.41 to 82.91	74.33 to 80.83	67.16	66.32	75.28	74.44	66.12	69.25

B. FUTURE COSTS - CHURCHILL

The costs presented in the previous sections are for a system as it exists today. They do not represent any future infrastructures investments. Any major infusion of capital will lead to a direct increase in the unit cost per tonne for the movement of grain through Churchill.

The various capital expenditures outlined in the previous sections would lead to the following cost per tonne increases (All per tonne costs are based on a movement of 750,000 tonnes per year). See Table 10 for detailed breakdown.

TABLE 10

ESTIMATED COSTS OF MOVING WHEAT FROM SASKATCHEWAN THROUGH REFORD TO WESTERN EUROPE AND JAPANESE PORTS IN 1984

	CHURCHILL Reford/Hague		THUNDER BAY DIRECT Reford/Hague		THUNDER BAY & ST. LAWRENCE Reford/Hague		VANCOUVER	PRINCE RUPERT
COUNTRY ELEVATOR COSTS								
- elevation	6.40		6.40		6.40		6.40	6.40
- storage	2.00		2.00		2.00		2.00	2.00
- shrinkage	.43		.43		.43		.43	.43
TOTAL	8.83		8.83		8.83		8.83	8.83
RAIL COSTS								
Rail Rate:								
- producer	7.82	7.19	8.08	7.82	8.08	7.82	8.08	8.08
- federal contribution	17.91	16.46	18.49	17.91	18.49	17.91	18.49	18.49
- SUB TOTAL	25.73	23.65	26.57	25.73	26.57	25.73	26.57	26.57
Other Line & Volume Related Costs: start-up	.42							
- Line related	8.47							
- add. volume related	1.99							
- distance related								3.13
- SUB TOTAL	10.60	10.60						
TOTAL	36.61	34.53	26.57	25.73	26.57	25.73	26.57	29.70
TERMINAL COSTS								
- elevation	4.58		4.18		4.18		4.18	4.18
- cleaning	2.01		1.58		1.58		1.58	1.58
- storage	.93		.93		.93		.93	.93
- outward CGC fees	.79		.79		.79		.79	.79
- other fobbing costs	.31		.11		.11		.11	.11
- SUB TOTAL	8.62		7.59		7.59		7.59	7.59
- Additional CGC Costs	.25		-		-		-	-
TOTAL	8.87		7.59		7.59		7.59	7.59
LAKE TRANSPORTATION								
- freight & fuel surcharges					13.35			
- other costs					1.66			
TOTAL					15.01			
ST. LAWRENCE PORTS								
-elevation(in and out)					3.70			
- storage					1.09			
- other fobbing costs					.29			
TOTAL					5.08			
OCEAN FREIGHT	22.10 to 28.60		24.17		12.20		23.13	23.13
GRAND TOTAL	76.41 to 82.91	74.33 to 80.83	67.16	66.32	75.28	74.44	66.12	69.25

FUTURE COSTS	Annual $ Per Tonne	Amortization Period (Years)
Rail		
. Boxcar Rehabilitation		
- with roller bearings	$6.83	5
- with friction bearings	$17.33	5
. Prototype Car	$6.90	30
. Line Upgrading	$2.35	20
Terminal		
. Hopper Car Requiring Pit	$0.1	20
. Dust Control Equipment		20
. Tug	$2.54	30
. Dredging		10

XI OBSERVATIONS

Given the number of limitations encountered in preparing this study, especially in regards to ocean freight, it should be stressed that these costs are not absolutes, but rather represent the general cost positions of the various ports examined.

Nonetheless, some observations can be made.

1. The grain movement through Churchill is marginally more expensive than the movement through the Thunder Bay and St. Lawrence Seaway System with the West Coast offering a direct cost advantage over the Eastern movement.

2. The direct and indirect rail costs of the grain movement to Churchill are substantially higher than that of any other port given the inclusion of line related costs.

3. If the CTC rules that Thicket Subdivision is grain dependent, the additional line related costs will clearly make Churchill the most costly port to ship grain through.

Costs in themselves only offer one side of the equation in determining which port should be selected. The other factor is price. The fact that costs of moving grain to port are greater than an other can be immaterial if the realized price more than offsets any cost differences. Given the confidentiality of CWB realized prices through the various ports(29) a comparison taking into account both factors was not possible.

(29)Based on discussions with officials of the Canadian Wheat Board

However, it is the Committee's understanding that to attract grain buyers to Churchill, the Canadian Wheat Board may discount its grain prices to that port, and in the past this has been done. With the cost of moving grain through Churchill nearly equal to or slightly higher than the Thunder Bay/St. Lawrence movement every discounted dollar at Churchill leads to a direct dollar advantage to the Thunder Bay/St. Lawrence movement or the West Coast Movement.

Furthermore, the Subcommittee believes that, given the close cost relationship, a requirement of a minimum tonnage movement is not in the best interest of Western Canadian producers.

The Subcommittee recognizes that Churchill serves or may serve purposes other than simply an export position for grain. Churchill may have a role to play in the development of Canada's North, Arctic oil or national defence and scientific research, and future development or upgrading costs may be justified on these grounds. However, if that is the case, then the farmer or grain handling and transportation system should not incur any of these costs placed upon them either through the rate structure or indirectly.